



Advanced Videoconferencing for Computational Fluid Dynamics (CFD) Research Project Meetings

Meeting Context	
Subject	<ul style="list-style-type: none"> Bridge Hydraulics Using Computational Fluid Dynamics
Participants	<ul style="list-style-type: none"> Argonne National Laboratory - TRACC (Illinois) Northern Illinois University (Illinois) Turner-Fairbank Highway Research Center (Virginia) University of Nebraska - Omaha (Nebraska)
Meeting Method	<ul style="list-style-type: none"> Project report status, sharing of results, discussion, future planning
Meeting Frequency	<ul style="list-style-type: none"> Monthly
Technical Context	
Conference Type	<ul style="list-style-type: none"> Multipoint
Technology Used	<ul style="list-style-type: none"> H.323-based videoconferencing with H.239 data sharing
Additional Equipment	<ul style="list-style-type: none"> Polycom HDX 8004 HD codecs LifeSize HD Room System
Contact	
TRACC Research Staff	<ul style="list-style-type: none"> Steve Lottes (slottes@anl.gov)
TRACC Collaboratory Staff	<ul style="list-style-type: none"> Gail Tate (get@anl.gov) Jonas Talandis (jonast@anl.gov) Joe Reitzer (joer@anl.gov) Larry Amiot (amiot@anl.gov)

Background

Argonne National Laboratory, in cooperation with the U. S. Department of Transportation (USDOT) Research and Innovative Technology Administration (RITA) has established the Transportation Research and Analysis Computing Center (TRACC), a state-of-the-art modeling, simulation, and high performance computing center located at the DuPage National Technology Park in West Chicago, Illinois.

TRACC uses Computational Fluid Dynamics (CFD) to improve analysis of the effects of wind and water forces on bridges and other hydraulic structures. Researchers at TRACC, Turner-Fairbank Highway Research Center (TFHRC), the University of Nebraska and Northern Illinois University collaborate on the study of CFD-based simulation techniques. With reduced-scale experiments from the TFHRC hydraulics laboratory providing the data for CFD model development, the researchers produce a validated advanced simulation methodology for open-channel flow, with an emphasis on bridge scouring. The geographically dispersed team needs to share status, analyze results, discuss challenges, and develop potential solutions. This case study describes the application of videoconferencing for this collaboration.

Why Videoconferencing Was Chosen

The sharing of project results among the distributed research team was vital to this study of CFD-based simulation techniques. Initially, team meetings were held via teleconference but the need to show data during the discussions required the delivery of video, audio and data of the highest possible quality to participants located at each site. There also was a need for interactions between the participants to ask and answer questions during discussions. Advanced videoconferencing based on the standard H.323 videoconferencing protocol met these needs.

The Execution

The initial meeting was held in March 2009. H.323-based videoconferencing technology was used to create a virtual meeting room with video and content sharing between three sites: TRACC, located in West

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Chicago, IL; Turner-Fairbank Highway Research Center, McLean, VA; and the University of Nebraska in Omaha, NE.

Large displays at each site featured views of the other sites and the technical material. All three sites used end points capable of high-definition video as well as supporting the H.239 data sharing protocol. The TRACC and Turner-Fairbank sites both used *Polycom HDX 8004* high-definition codecs. The University of Nebraska used a *LifeSize Room* system.

Evaluation Comments

The previous mode of collaboration was to have monthly teleconferences, plus two or three events per year that required air travel. Teleconferences were found useful in discussing high-level status, but technical discussion was limited due to the inability to share content. Content sharing is possible with internet meeting software; however, face-to-face interaction is limited. Videoconferencing allows virtual meetings to take place with more participants than face-to-face meetings because students and other interested researchers who would not necessarily attend a meeting due to travel, can easily attend a videoconference. Meetings can be held on an as-needed basis with consequent productivity gains in the collaborative research effort.

The videoconferencing technology deployed has received high marks. The three virtual meetings held in the spring of 2009 were found to have accelerated the pace of progress on the challenging problem of scour analysis than the collaborating researchers thought possible. Attendees have been enthusiastic about the ability to meet on a more frequent basis for detailed discussions. The technology for content sharing has proven essential in facilitating the technical exchange of information and ideas. Some experimentation in using the communication technology to its best advantage is still ongoing. For example, using a touch screen to provide capability to write equations, sketch a diagram or overlay content to present alternatives and point out features of significance is currently being investigated.

The Barriers

Although not a problem for these meetings, the *Polycom HDX 8004* codec has a maximum capacity to bridge four end points. Larger numbers of remote H.323 sites would require alternate bridging resources or a Multipoint Control Unit (MCU).

The Enablers

Each videoconferencing site had broadband connectivity with Internet2 providing the interconnecting backbone. Each site was able to connect at 1920 kbps thus providing good video quality. Each site had a modern codec (either *Polycom HDX 8004* or *LifeSize Room* systems) that support high quality connectivity and H.239 data sharing.

It should also be mentioned that an important aspect to a good videoconference is testing the facilities well before the scheduled event. All sites were ready and eager to participate in pre-event qualification tests.

Advice for New Users

Videoconferencing encourages collaboration and sharing of information between participants in all types of distributed events. Good technical support is essential for a successful event, by providing the appropriate resources for the intended participants and content and by establishing reliable performance at all sites.

It is best when speakers are briefed in advance regarding the nature of videoconferencing, the use of specific microphones and camera presence, as well as what to expect. Discussions need to be clearly heard by all participants to be effective and the information presented should be shared with all remote sites.

For further information, contact

Tanju Sofu

630-252-9673

tsofu@anl.gov

www.tracc.anl.gov